REMARKS

Claims 1, 2, and 4-24, are presently pending in the application. Claim 3 has been canceled and Claims 21-22 have been withdrawn from consideration as being directed to non-elected inventions. Reconsideration and allowance of all claims are respectfully requested in view of the following remarks.

Claims 16 and 17 are rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s) at the time the application was filed, had possession of the claimed invention. The Examiner alleges that "selective deposition of a masking material to form a first pattern" is not disclosed.

The Applicants respectfully submit that "selective deposition of a masking material to form a first pattern is disclosed at page 8, lines 21-24, of the present specification, which discloses a layer of silicon dioxide or silicon nitride being deposited, by for example, sputtering, on the surface of the base crystal layer 12, after which the layer is patterned using photolithography and dry etching, for example, to form a first mask pattern 13.

Accordingly, the rejection of Claims 16 and 17 under 35 U.S.C. §112, first paragraph, should be withdrawn.

The Examiner has rejected Claims 1-20 and 23-24 under 35 U.S.C. §112, second paragraph, as being indefinite. Claim 3 has been canceled. The lack of antecedent basis has been corrected in the remaining claims. However, with respect to the term "predetermined", the Applicants respectfully submit that the word "predetermined" is not indefinite, since it simply refers to the fact that the thickness of the crystal, for example, is chosen in advance, and that the crystal is grown to that prechosen or predetermined thickness. The word "predetermined" with respect to various features or attributes is commonly used in claim language, and is not indefinite.

Accordingly, Claims 1, 2, 4-20, and 23-24 are not indefinite, and the rejection of Claims 1, 2, 4-20, and 23-24 under 35 U.S.C. §112, second paragraph, should be withdrawn.

The Examiner has rejected Claims 1-2, 7, 11-19, and 23, under 35 U.S.C. §102(b) as being anticipated by Pribat et al. The Examiner has rejected Claims 1-2, 7, 11-15, and 23-24, under 35 U.S.C. §102(e) as being anticipated by Tsuda et al. The Examiner has rejected Claims 3-4, 20 and 24, under 35 U.S.C. §103 as being unpatentable over Pribat. Claims 3-4 were rejected under 35 U.S.C. §103 as being unpatentable over Tsuda et al. The Examiner has rejected Claims 3-6 and 8-10 under 35 U.S.C. §103 as being unpatentable over Pribat et al. or Tsuda et al. in view of Fleming et al. Claim 3 has been canceled and its recitations included in Claim 1. For the following reasons, the prior art rejections are respectfully traversed.

The Applicants respectfully submit that neither Pribat et al. nor Tsuda et al. teaches or suggests a method of manufacturing a crystal of a III-V compound of the nitride system, including wherein one of at least one pitch of pattern elements of the first plurality of patterns and the at least one pitch of pattern elements of the second plurality of patterns are different from each other, as recited in amended Claims 1 and 23.

Pribat et al. disclose in Figs. 27-29, a first layer of bands 23, 24 and dielectric material 20-22, which appear to be of the same pitch as a second layer of bands 43, 44, 45 and dielectric material 40-42. This is further supported by the disclosure which describes the first dielectric material 2 having first bands 23, 24 of having a width of 0.5 to a few microns, and spaced (apparently evenly from Figs. 27-29) at distances of some microns to hundreds of microns (see col. 11, lines 3-7), and the second layer of dielectric having apertures 43-45 (of apparently the same width as the first bands 23, 24, from Figs. 27-29) (see col. 11, lines 38-44).

In other embodiments, the dielectric material and bands appear to also have essentially the same

pitch (i.e., insulator strips 20-22 of Figs. 5-9, having a width of 20 to 100 micrometers, separated by spaces 23, 24 of 1 to 20 micrometers (see col. 5, lines 64-66), and second silica layers 40-42 having apparently (from Figs. 5-9) a same width of 20 to 100 micrometers, with apertures 43-45 ranging from the same 1 to 20 micrometers as spaces 23, 24 (see col. 5, lines 61-67)).

Tsuda et al. disclose in Figs. 1 and 6, a first patterned mask of a silicon dioxide film 102 patterned with a periodic stripe of the same pitch as a second mask of silicon dioxide film 104. This is supported by the specification which states that the first patterned mask of silicon dioxide 102 is patterned to a periodic stripe of pitch about 10 μm (see col. 7, lines 32-42), and a second silicon dioxide mask 104 formed in the same way as the first silicon dioxide mask 102 with a periodic stripe of a pitch of about the same 10 μm (see col. 7, line 64 to col. 8, line 1, and col. 8, lines 13-18).

Other embodiments in Tsuda et al. disclose the same pitch for the upper and lower silicon dioxide layers, for example: a first silicon dioxide mask 302 of a stripe shape of about 8 μm pitch, with a second silicon mask 304 of about 8 μm pitch (see col. 9, lines 23-43); and a first silicon dioxide mask 402 in a stripe shape of about 8 μm pitch, with a second silicon mask 404 in a stripe shape of about a 8 μm pitch (see col. 10, lines 10-24).

In contrast, the present invention discloses that the pitch of the pattern elements of the first and the second plurality of patterns are different from one another (see page 13, line 22, to page 14, line 17, of the present specification). Thus, the difference in pitch allows the stripes of the first mask pattern 13 and the pitch of the second mask pattern 15 not to overlie one another, without prealignment of the first mask patter 13 and second mask pattern 15, facilitating manufacture.

Accordingly, Claims 1 and 23 are not anticipated by either Pribat et al. or Tsuda et al., and the rejection of Claims 1 and 23 under 35 U.S.C. §102 should be withdrawn.

Further, with respect to Pribat et al., since Claims 2, 7, and 11-19, depend from Claim 1, they are

also patentably distinguishable over Pribat et al. for the reasons cited above with respect to Claim 1.

Still further, with respect to Tsuda et al., since Claims 2, 7, 11-15, depend from Claim 1, and Claim 24 depends from Claim 23, they are also patentably distinguishable over Tsuda et al. for the reasons cited above with respect to Claim 1.

With respect to Claim 4, neither Pribat et al. nor Tsuda et al. teaches or suggests a relationship between the pitch of the pattern elements of one of the first and the second plurality of pattern elements being $0.1\ \mu m < p_1 \times p_2 / | p_2 - p_1 | < 5000\ \mu m$, where p_1 denotes the pitch of the pattern elements of one of the first plurality of patterns and p_2 denotes the pitch of the pattern elements of one of the second plurality of patterns.

Rather, as stated above with respect to Claim 1, Pribat et al. and Tsuda et al. are silent with respect to a difference in pitch between the pattern elements of the first and second plurality of patterns. Further, although the Examiner claims that it would be obvious to obtain a different pitch, the Examiner is incorrect, since if the applied prior art references do not teach or suggest the claimed features of the present invention, then the Examiner has not met his burden of proving a *prima facie* case of obviousness. All the claim limitations must be taught or suggested by the prior art in order to establish a prima facie case of obviousness. *In re Royka,* 490 F.2d 981, 180 USPQ 580 (CCPA 1874).

Still further, the relationship recited in Claim 4 is a result effective variable which achieves a recognized result, before the determination of the optimum or workable ranges of the variable might be characterized as routine experimentation (see generally MPEP 2144.05). There is no teaching or suggestion in the cited art that the particular relationship with respect to the pitch is a result-effective variable for achieving the advantageous results of the present invention.

Thus, the Examiner has not cited a reference which teaches the relationship recited in Claim 4. Mere allegations by the Examiner that certain differences between the claimed subject matter and the

cited art would have been obvious do not create a presumption of unpatentability. *In re Soli*, 317 F.2d 941, 137 USPQ 797 (CCPA 1963).

The addition of the Fleming et al. does not make up for the deficiencies in either Pribat et al. or Tsuda et al. Fleming et al., similarly to Pribat et al. and Tsuda et al., are silent with respect to the relationship recited in Claim 4 with respect to the pitch. In fact, Fleming et al. teach a pitch of 0.65 μ throughout the disclosure (see col. 12, line 50, and col. 14, line 25), rather than any particular relationship with respect to the difference in pitch between two striped layers.

Accordingly, Claim 4 is not obvious over either the individual or the combination of the Pribat et al. or Tsuda et al., and Fleming et al. references, and the rejection of Claim 4 under 35 U.S.C. §103 should be withdrawn.

Further, since Claims 4-6, 8-10, and 20 depend from Claim 1, and Claim 24 depends from Claim 23, they are also patentably distinguishable over either Pribat et al., Tsuda et al., and Fleming et al., for the reasons cited above with respect to Claims 1 and 23.

If the Examiner believes that there is any issue which could be resolved by a telephone or personal interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee for such an extension is to be charged to Deposit Account No. 19-3140.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Page 1, prior to the heading "BACKGROUND OF THE INVENTION", the following paragraph was inserted:

The present application claims priority from Japanese Patent Application No. 11-341637, dated December 1, 1999.

Page 6, the first full paragraph was amended as follows:

In the method of manufacturing a crystal of a III-V compound of the nitride system, the crystal substrate of a III-V compound of the nitride system, the crystal film of a III-V compound of the nitride system and the method of manufacturing a device according to the invention, it is ensured that the development of dislocations is prevented in a region where a plurality of patterns [do] does not overlie one another in the direction of the thickness of the crystal. Moreover, there [are] is a region where the patterns overlie one another and a region where the patterns do not overlie one another, and both regions coexist. This causes a region where the plurality of patterns [do] does not overlie one another (that is, a region where it is ensured that the development of dislocations is prevented) to be provided without accurate alignment of the patterns.

IN THE CLAIMS:

Claim 3 was canceled.

The claims were amended as follows:

1. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system, the method comprising: [a growth step of]

growing a crystal of a III-V compound of the nitride system having a predetermined thickness on [the] a surface of a basal body,

wherein the growth step comprises:

forming a first plurality of patterns of at least one pitch, in [separate positions] one position in [the] a direction of [the] a thickness of the crystal, and;

forming a second plurality of patterns of at least one pitch, in another position in the direction of the thickness of the crystal;

wherein the second plurality of patterns at least partly [overlie] overlies [one another] said first plurality of patterns in the direction of the thickness of the crystal and at least partly [do] does not overlie [one another] said first plurality of patterns in the direction of the thickness of the crystal;

wherein said one of at least one pitch of pattern elements of said first plurality of patterns and said at least one pitch of pattern elements of said second plurality of patterns are different from each other.

2. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 1,

wherein each of the first and second plurality of patterns takes form in pattern elements arranged in one direction in a plane almost parallel to the surface of the basal body.

4. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim [3] 2,

wherein [the] a relationship between the pitch of the pattern elements of one of the first plurality of patterns and the pitch of the pattern elements of [another] one of the second plurality of patterns is:

$0.1\ \mu m < p_1 \times p_2 / |p_2 - p_1| < 5000\ \mu m$

where p_1 denotes the pitch of the pattern elements of one of the first plurality of patterns and p_2 denotes the pitch of the pattern elements of [another] one of the second [of the] plurality of patterns.

5. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 2,

wherein at least one of the first and second plurality of patterns each has pattern elements arranged in a plurality of different pitches.

6. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 2,

wherein at least one of the first and second plurality of patterns has one of pattern elements arranged at a plurality of different intervals [or] and has pattern elements of a plurality of different lengths in the direction of the arrangement of the pattern elements.

7. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 2,

wherein the pattern elements of each of the first and second plurality of patterns are in [the] a form of stripes.

8. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 1,

wherein each of the first and second plurality of patterns takes form in pattern elements arranged in two directions in a plane almost parallel to the surface of the basal body.

9. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 8,

wherein there [are] is a region where the second plurality of patterns [overlie] overlies [one another] the first plurality of patterns in the direction of the thickness of the crystal and a region where the

first plurality of patterns [do] does not overlie [one another] the second plurality of patterns in the direction of the thickness of the crystal, and both regions coexist in one direction of the two directions.

10. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 8,

wherein there [are] is a region where the second plurality of patterns overlie [one another] the first plurality of patterns in the direction of the thickness of the crystal and a region where the second plurality of patterns [do] does not overlie [one another] the first plurality of patterns in the direction of the thickness of the crystal, and both regions coexist in both of the two directions.

11. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 1,

wherein the growth step further comprises:

a first pattern formation step in which a first pattern is formed one of directly on the basal body [or] and on the basal body with a predetermined base layer in between;

a first growth step in which an intermediate layer as part of the crystal is deposited on one of the surface of the basal body [or] and on the surface of the base layer with the first pattern formed thereon;

a second pattern formation step in which a second pattern is formed on the surface of the intermediate layer deposited in the first growth step; and

a second growth step in which a top layer as part of the crystal is deposited on the surface of the intermediate layer with the second pattern formed thereon.

12. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 11,

wherein at least one of the first pattern and the second pattern is comprised of a masking material.

13. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 12,

wherein the masking material includes silicon (Si) and at least one selected from the group consisting of oxygen (O) and nitrogen (N).

14. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 11,

wherein the basal body comprises one of sapphire (Al_2O_3), silicon (Si), silicon carbide (SiC), gallium arsenide (GaAs), magnesium aluminum composite oxide ($MgAl_2O_4$), lithium gallium composite dioxide ($LiGaO_2$) [or] and gallium nitride (GaN).

15. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 11,

wherein the base layer is deposited by growing a III-V compound of the nitride system on the basal body.

16. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 15,

wherein the first pattern formation step comprises:

forming the first pattern by selective deposition of a masking material on the surface of the base layer,

and the growth step further comprises[,]:

between the first pattern formation step and the first growth step,

a step of etching the base layer through the first pattern as a mask.

17. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 15,

wherein the second pattern formation step comprises:

forming the second pattern by selective deposition of a masking material on the intermediate layer deposited in the first growth step,

and the growth step further comprises[,]:

between the second pattern formation step and the second growth step,

a step of etching the intermediate layer through the second pattern as a mask; and

a step of removing the masking material of the second pattern.

18. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 11,

wherein the first pattern formation step comprises:

forming the first pattern by forming an indentation in one of the surface of the basal body [or] and in the surface of the base layer.

19. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 11,

wherein the second pattern formation step comprises:

forming the second pattern by forming an indentation in the surface of the intermediate layer deposited in the first growth step.

20. (Amended) A method of manufacturing a crystal of a III-V compound of [the] a nitride system as claimed in claim 11, further comprising:

[a step of] separating at least the basal body from the crystal.

23. (Amended) A method of manufacturing a device by forming a predetermined device film on [the] a surface of one of a crystal substrate [or] and a crystal film, the method comprising:

forming one of [a growth step in which] the crystal substrate [or] and the crystal film [is formed] in a growth step by growing a crystal of a III-V compound of [the] a nitride system having a predetermined thickness on [the] a surface of [the] a basal body; and

forming a predetermined device film [a device film formation step in which the predetermined device film is formed] on one of the crystal substrate [or] and on the crystal film in a device film formation step,

wherein the growth step comprises:

forming a first plurality of patterns of at least one pitch in [separate positions] one position in [the] a direction of the thickness of the crystal, and

forming a second plurality of patterns of at least one pitch, in another position in the direction of the thickness of the crystal;

wherein the first plurality of patterns at least partly [overlie] overlies [one another] the second plurality of patterns in the direction of the thickness of the crystal and at least partly [do] does not overlie [one another] the second plurality of patterns in the direction of the thickness of the crystal; and

wherein the at least one pitch of pattern elements of the first plurality of patterns and the at least one pitch of pattern elements of the second plurality of patterns are different from each other.

24. (Amended) A method of manufacturing a device as claimed in claim 23, further comprising:

[a step of] separating the basal body from one of the crystal substrate [or] and from the crystal film.

IN THE ABSTRACT OF THE DISCLOSURE:

The Abstract of the Disclosure was amended as follows:

A crystal substrate and a crystal film of a III-V compound of the nitride system which are manufactured easily and have few dislocations[. A] as well as a method of manufacturing a crystal [for the manufacture thereof,] and a method of manufacturing a device with the use thereof are disclosed. On a basal body, formed in order are a base crystal layer of, for example, gallium nitride (GaN), a first mask pattern of, for example, silicon dioxide (SiO_2), an intermediate crystal layer of, for example, gallium nitride, a second mask pattern of, for example, silicon dioxide, and a top crystal layer of, for example, gallium nitride. The first and second mask patterns have stripes arranged at least in one direction at unequally spaced intervals. The stripes are different in pitch from pattern to pattern. Thus, the mask patterns at least partly overlie one another in the direction of the thickness of the crystal layers.